

Zero Retries 0246

2026-04-10 - What's New at DLARC - April 2026, MOP Web Page is Back, New AX.25 library for ESP32 Microcontrollers, Introducing Radio Terminal, CascadiaMesh, Video - Best Radio for Decoding APRS/Packet

Steve Stroh N8GNJ

Zero Retries is an independent newsletter promoting technological innovation in and adjacent to Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Radios are computers - with antennas! Now in its fifth year of publication, with 3500+ subscribers.

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Substack says this issue is **too big for email apps**. Thus, it might be easier to read in a web browser - <https://www.zeroretries.org/p/zero-retries-0246>

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The Usual Administrivia

Footnotes for This Issue

I-Frame

By Steve Stroh N8GNJ

Brief notes about this issue of Zero Retries.

Paid Subscribers / Founding Members Update

My thanks to **Tom Nolan W3EX** for *renewing* as an **Annual Paid Subscriber** to Zero Retries this past week!

My thanks to **Prefers to Remain Anonymous 67** for *renewing* as an **Annual Paid Subscriber** to Zero Retries this past week!

My thanks to **Jake Steijn KK7HAQ** for *upgrading* from a free subscriber to Zero Retries to an **Annual Paid Subscriber** this past week!

KK7HAQ included this nice note:

I've been reading you for a couple of years, if I recall right. Good stuff and you deserve at least a little support.

My thanks to **Prefers to Remain Anonymous 124** for becoming a *new Annual Paid Subscriber* to Zero Retries this past week!

Financial support from Zero Retries readers is a significant vote of support for the continued publication of Zero Retries.

MoonRF Quad Likely Priced at \$399, Not \$2k

In Zero Retries 0245, [open.space - Moon Launch Update!](#) I speculated that the cost of a MoonRF Quad tile (4 units) could be priced at \$2,000. I don't remember why I offered that (totally unfounded) guess of that price point. Turns out I was way off (5x too high). I added this to the article:

Post Publication Update: *Email from Martin McCormick K1MCC:*

The QuadRF [kit] is likely to be \$399, not \$2000.

*Wow. Just... **Wow.** That's an incredibly reasonable price point.*

I'm really looking forward to MoonRF's crowdfunding campaign, not so much for being able to put a phased array 5 GHz antenna to immediate use... but I really want to vote with my wallet to help encourage the emergence of this technology into Amateur Radio.

Please direct comments / feedback about I-Frame to the Zero Retries email list with the #ZR0246 hashtag.

What's New at Digital Library of Amateur Radio & Communications - April 2026

By Kay Savetz K6KJN

Greetings from DLARC World Headquarters in sunny Oregon, where I am thrilled to announce that the DLARC free online ham radio library now has a selection of the "big three" American amateur radio magazines: CQ, QST, and 73.

Here's the TL;DR: we have [every issue of 73 Amateur Radio](#) (516 issues published from 1960-2003), [530 issues of QST](#) from its founding in 1915 through 1961, and now [199 issues of CQ Magazine](#) published from 1946 through 1963! The "big three" U.S. amateur radio magazines.

The non-TL;DR "give me more information!" version is that DLARC is now home to those 199 issues of [CQ Amateur Radio Magazine](#), published from 1946 through the end of 1963. The pre-1964 issues have fallen into the public domain, so they're available for us all to read and use.

CQ's final issue was published in October 2023, and publisher Dick Ross (K2MGA) died a few months later. The legal status of CQ Magazine is in flux. I'm not sure anyone knows yet what will happen to the material published from 1964 through 2023 — but having access to the first nearly two decades of the magazine is huge news. Many of the issues came to DLARC via the SPARK Museum of Electrical Invention, and some scans came from the University of Illinois Chicago.

But there's still work to be done: CQ magazine launched in 1945. DLARC doesn't yet have January 1945 (volume 1 number 1) through March 1946 (volume 2 number 3), most of volume 3, and a smattering of issues in volumes 4, 11, and 12. Those are now in the [DLARC Wantlist](#).

I've told the story of [73](#) here a few times: before Wayne Green (publisher of 73) died, he contributed a complete set of the magazine to Internet Archive and asked that they be made freely available. That collection was just about the first thing I added to DLARC when the project launched.

The last of the big three, arguably the best known, is QST, which has been published by the ARRL since 1915. The ARRL is a member organization, and they work hard to create great information exclusively for their members, which is 1000% their right and privilege. Like CQ, the oldest issues are old enough to be in the public domain, which means the [530 issues published before 1962 are here to enjoy](#). (When you click the link, you'll see something like 609 results. Some of those are indexes, not issues. Indexes are available all the way through 2001.)

There's more in the works (soon!) for DLARC. I'm preparing a post for the [Internet Archive blog](#) for World Amateur Radio Day, April 18, that will announce the other new stuff. In the meantime, there are [plenty of ham radio magazines](#) to keep you busy.

Digital Library of Amateur Radio & Communications is funded by a generous grant from Amateur Radio Digital Communications (ARDC) to create a free digital library for the radio community, researchers, educators, and students. If you have questions about the project or material to contribute, contact me at kay@archive.org.

...

Editor's Note - Just a reminder that K6KJN will be representing DLARC at [Hamvention 2026](#) in Xenia, Ohio - 2026-05-15 thru 17. Stop by at booth 1506 in Building 1 / Maxim to say Hi.

Post Publication Update - My article published in ZR 246 just yesterday is already obsolete. Thanks to Daniel Bateman at hamcall.net who filled in the gaps in our collection, DLARC now has a complete set of CQ Magazine from its launch in 1945 through the end of 1963.

<https://archive.org/details/cq-amateur-radio?sort=date>

Please direct comments / feedback about this article to the [Zero Retries email list with the #ZR0246 hashtag](#).

ZR > BEACON

By Steve Stroh N8GNJ

*Short mentions of **Zero Retries Interesting** items.*

MOP - It's (Web Page) is Back!

In [Zero Retries 0239](#), I wrote (admittedly a bit gushingly) about **Mesh Operations Protocol (MOP)**:

I could try to explain this, but the web page linked in the title is an absolute marvel of self-explanation. It's really amazing! Scroll down to see the sections Live Network Simulation, Cross-Country Delivery, and MOP vs. The Rest. Read those, and you're up to speed on the ideas of MOP.

But MOP's developer, Stefaan Desmet KO6IKR, *wasn't (then) quite ready* for MOP to be publicly known (he deliberately had not publicized it). My mention of the website in Zero Retries 0239 resulted

in a rush of questions he wasn't quite ready for, and K06IKR took the MOP website offline. I wasn't smart enough (then) to have "snapshotted it" to Internet Archive Wayback Machine. *I was bummed!* But after some encouragement, K06IKR has put the MOP website - <https://smasher.be/mop/> back online. And, yes, with a [snapshot of it into the Wayback Machine for posterity](#).

Although it was then, and currently is, a *concept / project in development* by K06IKR, it represents one of the best scoped set of ideas / concept / plans of a mesh network for operation on VHF / UHF bands.

A decentralized mesh network for amateur radio.

No sessions. No hubs. No closed-source software.

Just datagrams and beacons — short, efficient bursts.

...

VALIDATE

Integrity & Origin ID (Open)

Each message includes an open, non-obscuring integrity tag that lets receivers verify origin and detect tampering or corruption. Message contents remain readable to any receiving station in compliance with FCC Part 97.

ROUTE

Beacon-Driven Discovery

Gateways beacon every 10 min, relays every 15 min. Route knowledge ripples outward through re-broadcasts. No central directory — your routing table builds itself from what you hear.

ACCESS

CSMA/CA with Exponential Backoff

Listen before talk. If channel is busy, defer. Random backoff avoids collisions between stations that were both waiting. Directed frames get retried with exponential backoff.

MODULATE

OFDM at 4800 bps

First working version of a custom OFDM modem — early tests are very promising. Built in Python with numpy + sounddevice. Beacons use 1200 baud AFSK for APRS visibility.

TRANSMIT

Standard FM Voice Channel

3 kHz audio bandwidth. PTT via CAT command (Yaesu), VOX, or GPIO. No special hardware — any radio with a soundcard interface.

I think K06IKR made a lot of good decisions in his scoping of MOP. He's right - short bursts are the way to go, especially in urban areas (he's located in the Los Angeles, California area). The use of OFDM is another excellent technical choice, and he's one of a number of folks¹ that have chosen to

implement OFDM in the audio domain to allow use of existing VHF / UHF “data” radios (at 10 / 25 / 50 watt power levels).

KO6IKR states that MOP will be open source. When he completes his development work sufficiently to the point where he’s comfortable opening it up for collaboration and initial testing, I hope that he gets an enthusiastic response. *I think he **will** get an enthusiastic response.* I will jump at the chance to implement a test MOP system in N8GNJ / Zero Retries Labs.

An Old Concept That Could Be Resurrected

Jonathan Naylor G4KLX on the OpenDV email list:

For the last few months I have been working with the SX1255 RF I/Q device in various hardware configurations. We are not alone in working with this chip and there is already a lot of information and code available to help me. I am currently working on porting the MMDVM firmware over to using the device, but unlike the ADF7021 based hotspots, this hardware will support all modes, and potentially any new ones that appear.

Before I explain the reason for this post, let me tell you a short story. At Ham Radio in 2019 (in the “before” times), I was approached by Torsten DG1HT, of DMR+ fame, and he suggested that by using suitable SDR technology it would be possible to build a repeater that would offer a different DV mode on adjacent duplex channels. Technically this was easily achievable, my issue with that idea was to do with licensing. It’s probably true to say that in most European countries, and elsewhere, there just isn’t enough free spectrum to do that, and any such application to try it would be refused at the first hurdle. So apart from the thought experiment associated with it, I didn’t pursue it any further. It didn’t help that we didn’t have any suitable hardware available to try it with. However for low power personal hotspots, such problems don’t exist to any extent as long as you don’t connect it to a large antenna and/or use a power amplifier with it.

News has now reached me that the TETRA guys behind the SXceiver, which I am also using for development, are talking of using that hardware with two sets of channels, one for TETRA and one for DMR. Obviously the output power would be split in half for each carrier, but it is perfectly achievable. It also gets around the problem of integrating TETRA with the operation of the MMDVM in our particular case.

However it also got me thinking about taking this concept to its logical conclusion. How about being able to run multiple MMDVM instances, maybe each one locked to a specific mode, or maybe a couple of modes, connected to a separate program that interfaces to the SX1255 and makes suitable I/Q data available to each MMDVM based on a configuration file. Each MMDVM being unaware of the others. Each I/Q stream would be from a particular offset from the hardware centre frequency and within the configured bandwidth of the chip, and suitably frequency shifted and filtered, with the reverse being true on transmit. For obvious reasons this would have to be done in duplex mode. That would allow for some truly interesting configurations. The people that I would feel sorry for would be those creating dashboards to display it all!

For the DVM project, it would be possible for them to use one device to handle both the control and traffic channels in their P25 phase 1 trunking system instead of multiple duplex hotspots. The same hardware would be able to handle P25 phase 2 when they eventually implement it. Maybe even running it side-by-side with the phase 1 RF.

Any effort to amplify such a system would require very linear amplifiers, probably in class A, in order to ensure that there was no intermodulation between the different carriers. This would be easy for low powers, but would get difficult at higher power levels. There are also question marks about the overall spectral cleanliness of the SX1255 that need to be investigated.

I understand where G4KLX is coming from in this proposal, within the paradigm of making digital voice repeaters more utilitarian in accommodating multiple standards.

But...

~~My perspective is that Amateur Radio is about at the limit of accommodating digital multiple standards.~~

Post-publication Update - *That paragraph should have read:*

*My perspective is that Amateur Radio **repeater operations** is about at the limit of accommodating digital multiple standards.*

That omission was unfortunate and widened the scope of my statement beyond what I intended to say.

...

We're beginning to experience diminishing returns for putting up ever more *DMR* repeaters, and *System Fusion* repeaters, and *DMR* repeaters, and *D-Star* repeaters, and *M17* repeaters, and perhaps even future *BBFM* repeaters. New Amateur Radio Operators are justifiably confused and can suffer from the "paralysis of analysis" in trying to figure out if they want to invest in a DMR radio, or a D-Star radio, or a System Fusion radio, or a P25 radio, or a TETRA radio. All of those systems have their good points and bad points, and it's common that there are repeaters using each of those in a given (usually metro) area.

This Amateur Radio "Tower of DV Babel" is resulting in absurd situations like here in Western Washington, USA, the Western Washington Amateur Relay Association (WWARA)² is effectively mandating a policy that future repeaters (and, eventually existing repeaters) to be "[narrowbanded](#)" when, objectively monitored, there's ample channel airtime to accommodate multiples of the existing number of repeaters that are coordinated by WWARA... just not enough "pairs" for each repeater to have "it's own channel".

Being able to operate on multiple digital voice systems using the same radio is on the cusp of being a non-issue³ by the [LinHT](#) and successors. And the "capacity" issue of only so many repeater pairs being available might well be solved with the application of Single Channel Time Division Multiple Access technology. But neither of those potential solutions, nor (in my opinion) G4KLX's proposed system, address the "Tower of Babel" mess that is multiple modulation technologies being proliferated on repeater systems.

Thus, Joe Hamelin W7COM said it well in forwarding this item to me for Zero Retries (which I had not spotted before his mention):

And we could call it a Superpeater!

I understand the desire for accommodating (not obsoleting) the radios that individuals have invested in, and Amateur Radio being under no constraints to consolidate on a particular (digital) voice (or data) technology.

My [SuperPeater concept](#) accommodates whatever radio a user wants to use (or has) by setting up virtual receivers (using [ka9q-radio](#)) for each mode. *Purely for example*, here's an imagined "receiver map" for an imagined SuperPeater:

- 440.000 is monitored on the SuperPeater receiver for **FM** transmissions,
- 440.010 is monitored on the SuperPeater receiver for **M17** transmissions,

- 440.020 is monitored on the SuperPeater receiver for **DMR** transmissions,
- 440.030 is monitored on the SuperPeater receiver for **D-Star** transmissions,
- 440.040 is monitored on the SuperPeater receiver for **System Fusion** transmissions,
- 440.050 is monitored on the SuperPeater receiver for **P25** transmissions,
- 440.060 is monitored on the SuperPeater receiver for **NXDN** transmissions,
- 440.070 is monitored on the SuperPeater receiver for **TETRA** transmissions,
- 440.080 is monitored on the SuperPeater receiver for **DPMR** transmissions.
- 440.090 is monitored on the SuperPeater receiver for **POCSAG** transmissions.

Similarly, for data...

- 440.110 is monitored on the SuperPeater receiver for **1200 bps AX.25** transmissions,
- 440.120 is monitored on the SuperPeater receiver for **1200 bps AX.25 with IL2P** transmissions,
- 440.130 is monitored on the SuperPeater receiver for **1200 bps AX.25 with FX.25** transmissions,
- 440.140 is monitored on the SuperPeater receiver for **2400 bps AX.25 with IL2P** transmissions,
- 440.150 is monitored on the SuperPeater receiver for **3600 bps AX.25 with IL2P** transmissions,
- 440.160 is monitored on the SuperPeater receiver for **4800 bps AX.25 with IL2P** transmissions,
- 440.170 is monitored on the SuperPeater receiver for **9600 bps AX.25** transmissions,
- 440.180 is monitored on the SuperPeater receiver for **9600 bps AX.25 with IL2P** transmissions,
- 440.190 is monitored on the SuperPeater receiver for **19200 bps AX.25 with IL2P** transmissions.
- Any “hardware radio format” could be accommodated (it’s “just software”), such as a radio transmitting **SSB**.

What changes the game, and addresses G4KLX’s concern about spectrum is that the a SuperPeater would output a (unique, as yet undefined) wideband data stream, perhaps 100 kHz wide.

All of the above inputs (and as many more as required) would be translated into a “subsidiary” data stream. The receiver of a SuperPeater is (conceptually) simple and inexpensive:

- Raspberry Pi computer
- Software Defined Receiver - perhaps as simple as an RTL-SDR, or perhaps more capable such as a [HydraSDR RFOne](#).

- Unique software to receive the data stream and parse out each component as necessary (or interested in receiving) and route it into other applications using TCP/IP sockets.

With this concept, you transmit with “whatever radio” to the SuperPeater, and you receive with the SuperPeater receiver. This also accommodates the situation of Operator A using DMR wanting to converse with Operator B using D-Star, on the same repeater.

With some months of perspective, I think the SuperPeater concept has significant potential, especially in this era of quiet repeaters. It needs additional refinement and development of a reasonable specification. And, who knows... with perhaps a few more months of evolution in the capabilities of ClaudeAI, with a reasonable specification, perhaps I could end up doing the software development.

Transceive 1.4 Beta Testers Wanted

Georges Auburger WH6AZ via email (to the Transceive app email list)

Aloha,

I’m getting close to releasing a new update of Transceive. This version includes some significant plumbing changes, and I’m looking for people to help test it and make sure nothing broke.

Here’s what’s changed:

- Universal binary (Apple Silicon + Intel)
- Fix for DNS lookup when nodes use non-standard ports
- Updated authentication for AllStar public auth
- More robust node reachability (green/red status is more reliable, with less need to hit Cmd-R)
- New: reorder nodes with simple drag and drop
- New: add a memo to a node entry

I’m especially interested in people who can test against both public and private nodes. Also, I no longer have access to Intel hardware, so it would be great to have some Intel-based Mac users in the mix.

If you’re interested, head over to this link to join the beta on TestFlight:

<https://testflight.apple.com/join/rbWKPna5>

Thanks in advance for the help.

[Transceive](#) ([link to App Store entry](#)) is a \$20 MacOS app for connecting to AllStarLink4:

Radio for AllStarLink nodes

Transceive allows amateur radio operators to connect to their AllStar node from anywhere in the world. Operators can administer linked nodes, monitor traffic, and transmit audio, all from the comfort of their Mac. You will either need an account on the node you are connecting to or register for an AllStar account and use it to connect to public nodes.

ALLSTAR PUBLIC AUTHENTICATION

- Connect directly to public nodes with your AllStar account. Experience the AllStarLink network without the complexity of setting up your own node. A callsign is required to sign up for an AllStar account.

NODE CONNECTIONS

- Account information is stored for every node you manage. Passwords are securely stored in the macOS keychain.
- Hostname and port for public nodes are automatically looked up via DNS so you don't have to remember specific IP addresses.
- Node indicators let you know if your node becomes unreachable due to change in network conditions, for example when connecting to a new WiFi.
- Connect to up to 8 nodes at the same time.
- Nodes can be set to automatically connect when the application opens.

AUTOMATIC IDENTIFICATION

- Node attributes and location are displayed for each node.
- Callsign details such as name, license type and country are looked up automatically. (Availability varies by country of callsign issuance.)
- Node locations can be visualized on a map by clicking on the pin icon.

STELLAR AUDIO

- Experience high quality audio from any sources connected to your Mac.
- Monitor and adjust audio levels with the help of a calibrated audio monitor panel.
- Full duplex support.

RADIO LIKE

- Transmission is activated by holding down the PTT button or the SPACE bar.
- When transmitting, a timeout timer is displayed to help you avoid timing out a repeater.
- Latching PTT option provides a hands-free experience.

LINKED NODES MANAGEMENT

- Quickly link your node to other nodes on the network.
- Identify keyed nodes as they transmit.
- A history of previously linked nodes is preserved for easy access in the future.
- Automatic unlinking prevents you from inadvertently linking multiple nodes together. This feature can be turned off when necessary, for example when managing a hub.

CUSTOMIZATION

- Modify built-in DTMF commands to match your specific node configuration.
- Define your own DTMF sequence presets for quick access to frequent operations.

KEYPAD

- A keypad allows you to enter arbitrary DTMF commands for your node.

Transceive is independently developed and not affiliated with AllStarLink or its developers.

I haven't yet seen one, but a handheld Push To Talk microphone with a USB-C interface, similar in size, weight, and feel to a Motorola or a Kenwood mobile radio microphone would, in my opinion, sell very well for use with voice applications like Transceive. Yes, there are adapters for the "real" microphones, but they're clunky in comparison to handheld microphone with native, integrated USB-C. Having a native USB-C interface (hopefully properly, uniquely "signed"), they could be supported by apps like Transceive.



Image courtesy of Juma Communications

The [Juma Communications USB-C Speaker Microphone](#) (*finally...* someone *got* this concept) is designed for portable speaker / microphone / lapel use, and what I'm hoping for is a larger, heavier, *mobile* handheld microphone. (Admittedly I have big hands and such microphones just... *feel good* in my hand.) I think it would be fun to participating on a net via AllStarLink while sitting in a coffee shop, picking up the microphone to speak. *That* would be a conversation starter!

Significant Potential for Interference in Amateur Radio 420-450 MHz (70cm) Band in California

A Zero Retries reader alerted me to these FCC Special Temporary Authority grants for testing in California of high power operation in the 420-450 MHz band:

- [0504-EX-ST-2026](#), Hawthorne, CA

- [0528-EX-ST-2026](#), Hermosa Beach, CA
- [0529-EX-ST-2026](#), El Segundo, CA
- [0530-EX-ST-2026](#), Desert Center, CA

Typical verbiage (location changed with each STA):

Please explain in the area below why an STA is necessary:

To authorize the applicant's operation on the requested frequencies at Hawthorne, California, in order to perform near term testing and system integration that both prepares for an upcoming technology demonstration at the U.S. Army Yuma Proving Ground and enables the applicant to meet requirements under active and pending U.S. Government contracts.

Please explain the purpose of operation: Operations under the STA will consist of performance testing, system integration, and related development activities conducted to ready the equipment for an upcoming technology demonstration and capability evaluation at the U.S. Army Yuma Proving Ground and to demonstrate and verify performance needed to meet requirements under active and pending U.S. Government contracts.

...

Frequency: 420.00000000-450.00000000 MHz

Output Power/ERP: 3.000000 kW

Mean Peak: 11.020000 kW

Before you fire up your computers to protest to the FCC, recall that in the US, the US Government is the Primary user of 420-450 MHz (various agencies are allocated various segments). *Amateur Radio use of 420-450 MHz is secondary.* Unlike the earlier use of 420-450 MHz by AST Space Mobile - a private company, use of 420-450 MHz for a demonstration for a US Government project is, yes, a legitimate use of 420-450 MHz, and interference to Amateur Radio is... secondary.

Those of us not in California - enjoy (and use, hopefully productively, and publicly and innovatively) our use of 420-450 MHz! (Or for those of us above Line A, and Canada - 430-450 MHz.)

[New AX.25 library for ESP32 Microcontrollers](#)

Robert Ambrose N7GET in the Ninotnc email list:

I've been working on a component library for AX.25 on an ESP32 microcontroller. This library is specifically designed to be used to build (or generate) applications rather than an application in and of itself.

The first application I've created (generated) is a something I'm calling 'ESP-TNC'. It is at its core an AX.25 router that connects to a KISS TNC+radio station using a UART or RS-232 interface. It can connect to an existing WiFi network as a station or act as an Access Point. It allows multiple operators to connect to it using KISS or AGWPE over TCP/IP. As an example I've tested it with RMS Packet, RMS Express and Easyterm all connected to it at the same time. It also has a BBS, digipeater and a beacon capability.

I've paired this with a NinoTNC connected directly to the UART bypassing the USB interface and I think it works great.

This is alpha software. If there's anyone out there who is comfortable with working with microcontrollers and is interested in this kind of thing, I'm looking for to move this project to the next stage of a controlled release. I will be releasing this as open source under GPL3.

The energy and creativity that's going into the invention of new generations of TNCs are just amazing.

Introducing Radio Terminal

Andy O'Brien K3UK on the digitalradio email list:

I have set up a sub-group here called Radio Terminal , it is experimental digital mode software developed by a ham well-known to this group, Steinar LA5VA. If you are interested in contributing to the development of this software and its experimental modes , please apply to join <https://digitalradio.groups.io/g/RadioTerminal/topic/radioterminal/118693127> .

Please check your national rules to ensure the modes are permitted by your country .

Andy K3UK

What is RadioTerminal?

RadioTerminal is an open-source digital modem/terminal program written in Python. I have also made a Windows .exe version using PyInstaller. The program is still under development, but at the moment it includes these main parts:

1) Olivia (including an extended/experimental version)

With selectable FEC options, including: Walsh (8 tones, 250 Hz, compatible with fldigi), Golay, LDPC, Polar, Reed-Solomon, Turbo, Viterbi, BCH, and a combined Viterbi + Reed-Solomon mode that I call "Deep."

2) Olivia ARQ (experimental code)

Based on Olivia, but this is my own MFSK variant: 8 tones and about 250 Hz bandwidth. It uses Reed-Solomon as its core and has a custom ARQ mechanism.

3) SCAMP / Sgump (ported from FLDigi)

A direct port from the FLDigi code base, done with help from an AI tool. I have not changed the algorithm — only ported it to Python.

4) HFCSS

5) FHSS –

6) IFKP – Incremental Frequency Keyed

Sounds like an interesting project. Scamp is an interesting new mode, and of course I'm a long time fan of FHSS (Frequency Hopping Spread Spectrum).

CascadiaMesh

CascadiaMesh is an expanding community built mesh network primarily made up of solar-powered MeshCore radios across the coastal Pacific Northwest. Currently it covers British Columbia, Western Washington, and Western Oregon. The vibe is simple: a region-wide text messaging system that lets anyone message publicly or privately with anyone on the network. We proudly became the first large MeshCore network in North America and are still the largest by both geographic scale and daily active usage in North America.

The best part? It doesn't depend on outside infrastructure at all! No electrical grid power, no cell coverage, no internet. If the lights go out, the mesh can keep talking.

The choice of MeshCore, rather than Meshtastic, in CascadiaMesh goes a long way in fixing the worst of the issues of scaling LoRa based mesh networks on unlicensed bands.

First, I have to reflexively have to reset myself from framing mesh networks like this operating on unlicensed spectrum "versus" mesh networks operating on Amateur Radio spectrum (used by Amateur Radio Operators). *All independent radio experimentation that provides hands-on experience with radio technology* is a good thing.

Second, impressive as CascadiaMesh is, I'm not mentioning it as a unique achievement of the Pacific Coast of the United States (despite their claims). I've seen mentions of similar regional mesh networks developing all over the US, and of course, also in Europe, and probably in every other region - South America, Asia, Africa... wherever there is access to unlicensed spectrum and curious techies.

That said, Amateur Radio is "losing mindshare" to projects / networks / communities like this. While Amateur Radio has the potential to be able to do the equivalent of CascadiaMesh (and [Mesh America](#)), and considerably more, Amateur Radio hasn't made a significant enough investment in organizing such a program, or motivating manufacturers to develop mesh equipment for the unique capabilities of the Amateur Radio market, such as a LoRa radio operating at 25 or 50 watts on the Amateur Radio 420-450 MHz band (or the 222-225 MHz band).

Thus there may come a point where there will be, and more interesting, people to communicate and collaborate with, on unlicensed mesh networking. That might precipitate a tipping point where the default for a potential NewTechHam is to briefly consider Amateur Radio, but then decide to "just go have fun"; without the complication of getting an Amateur Radio license, arcane rules (no encryption, bandwidth / symbol rate limits) and just join in on the fun of networks and communities like CascadiaMesh. Or, arguably, we're past that point (I'm not sure).

I confess that despite being alerted to the existence of CascadiaMesh by my friend Michael Gan several weeks ago, I haven't taken the time to really learn about what CascadiaMesh is doing and the infrastructure it's developed.

My thanks to Zero Retries Pseudostaffer Steve Monsey N0FPF who reminded me of CascadiaMesh with this email:

Watch the packets fly!

<https://cascadiamesh.org/map/>

[HAM / Amateur Radio - Integrating the Linux and Radio Worlds Together](#)

This page is my attempt to capture my journey in the Amateur Radio (HAM) hobby where I've both learned and try to teach my learnings to my fellow HAMs. Hardware is always what people think about when it comes to this hobby but there lot more of powerful software available to complete the job. My primary focus on these pages is how to do that software on Linux even though there is a lot more options on Microsoft Windows. I'm doing my working on fixing that over time but the following documents will hopefully help other Linux-savvy HAMs!

Interesting reference page by [David Ranch KI6ZHD](#) with lots of detail and links about operating packet radio on Linux, including Raspberry Pi.

My thanks to Joe Hamelin W7COM for mentioning this for inclusion in Zero Retries.

[The mkiss Module Update is Actually a Pretty Big Deal](#)

Ben Kuhn KU0HN on the Zeroretries email list; reference **Zero Retries 0245** - [Updating the Linux MKISS Driver in Linux](#):

I was pretty excited to hear the news that someone is taking over maintainership of the mkiss module. Rumors have been going around for a few years now that the Linux AX25 stack may be dropped from the kernel completely due to some bugs and lack of maintainers. The article referenced the mkiss userland utility, but the mkiss kernel module (driver) is for KISS itself, including multidrop KISS.

From the source of the driver itself (<https://git.kernel.org/pub/scm/linux/kernel/git/stable/linux.git/tree/drivers/net/hamradio/mkiss.c?h=v6.19.11>)

```
MODULE_AUTHOR("Ralf Baechle DL5RB <ralf@...>");
```

```
MODULE_DESCRIPTION("KISS driver for AX.25 over TTYs");
```

There are other modules for 6PACK BPQEther, YAM, Baycom, and others; but the mkiss driver is what's used most these days. It's still **extremely** relevant for us Linux users as it's how the built-in AX25 stack is able to interact with legacy serial TNCs, Bluetooth TNCs like mobilinkd or those built in to newer radios, as well as software/sound card TNCs like Direwolf. The kernel's AX25 stack allows for native TCP/IP networking as well as access from applications that support it (PAT, Xastir, etc...). The vast majority of AX.25 software on Linux expects the Kernel/OS to handle these interfaces like it does any other hardware.

AGWPE is great for directly connecting a client to a modem, but KISS support built in to the OS makes more advanced things like IP networking much more seamless.

Thanks for that additional context, KU0HN!

Video - Best Radio for Decoding APRS/Packet Data?

Craig Lamparter KM6LYW:

Let's look at the internal modems built into many modern APRS-enabled radio and compare their reception and decode rates. Does Kenwood decode more packets than Yaesu? VGC/Vero? Finally, let's compare to a baseline SDR setup with a software modem to see the best-case scenario.

I'm looking forward to watching this entire video.

*Please offer comments / feedback about **ZR > BEACON** on the [Zero Retries email list with the #ZR0246 hashtag](#).*

Request To Send

By Steve Stroh N8GNJ

Editorial, Commentary, and Occasional Digressions

[Substack Can Post Without Emailing](#)

I was dreading the process of "backposting" issues of Zero Retries from www.zeroretries.radio to www.zeroretries.org (see below) because I expected there to be much confusion from Zero Retries email subscribers when they received those past issues via email (again - having received a "heads

up” email from Substack and the issue from Ghost). But I’d apparently overlooked the option in Substack to publish *only to the web, and not via email*. (When you do so, Substack puts up a warning that only a small minority of readers will see a web-only post. Substack is really email-centric). That was a great capability, and ideal for this situation.

That capability will also come in handy for some content that could be in the “date flow” of postings, something like a blog, instead of just creating “pages” which aren’t visible except via the top menu bar (such as [Zero Retries Guides](#)).

Zero Retries 0241 - 0244 backposted to Substack / www.zeroretries.org

I’ve “backposted” Zero Retries 0241, Zero Retries 0242, Zero Retries 0243, and Zero Retries 0244 on Substack / www.zeroretries.org (formerly published on Ghost / www.zeroretries.radio).

This is in service to consolidate all Zero Retries content to Substack / www.zeroretries.org. I’m not done yet - still to be backposted are ZR 0235 - ZR 0240. Doing so is a high priority so I can just get back to writing Zero Retries instead of this administrivia. I also have to move any articles that were created on www.zeroretries.radio. I’ve moved some of those, but not all.

DLARC is Such an Incredible Resource

It was so cool reading this month’s What’s New at DLARC column describing how there are now issues of not only the complete collection of 73 Magazine, but also the issues of CQ and QST that are public domain (out of copyright). At one point, I’ve been a subscriber of all of those magazines and it’s amazing to think that the issues that are in DLARC can be downloaded and read. You can easily scan through a year’s worth of issues in an evening.

One of the reasons I’m such a fan, and think that DLARC is such an incredible resource is that “Amateur Radio” magazines often cover developments outside of Amateur Radio, discussing fundamental radio technology. For example, the creation of artificial satellites is entirely within living memory (Sputnik 1 was launched 1957-10-04), and I’m sure the progress of various breakthroughs (such as the development of Geosynchronous Earth Orbit - GEO) satellites was discussed *as an exciting new development* in Amateur Radio magazines. I hope that perhaps the CQ archives could, somehow, be added to DLARC.

Another reason I love DLARC is that there have been so many times that Amateur Radio has attempted projects that weren’t quite feasible or sustainable with the technology or other resources of the era in which they were attempted. For example, Amateur Radio accomplished some amazing things with Amateur Radio satellites such as Packet Radio Satellites (PACSATs) that were expensive to create in the 1980s / 1990s. Now such capability is absolutely routine / easy / cheap. Other times, technological innovations were reported, but not formalized in enduring standards that are easy to reference.

Another was that, for a time, the US (and many countries) had reasonable local, regional, and national (and international) packet radio networks. Packet Radio in that era had a lot of technical issues - 1200 bps, no Forward Error Correction, multiple networking systems (TEXNET, Net/ROM, ROSE, etc.), the TNCs of the era weren’t very capable compared to modern embedded computers such as Raspberry Pi. But, for a while, it worked. We have better technology now, and arguably it’s easier and cheaper to recreate such networks.

My Presentation at SARC

Tina and I very much enjoyed our brief trip to Surrey (Vancouver) British Columbia, Canada for me to give a [presentation at Surrey Amateur Radio Communications Society](#).

Given the activity level of SARC and especially SARC's worldwide outreach via its stellar newsletterzine [The Communicator](#), as I was developing the presentation, the majority of the presentation morphed into the most comprehensive explanation I've done to date of NewTechHams. I plan to clean up and post that portion of the presentation, and expand it into the long promised detailed page on NewTechHams.

But one of the biggest draws of attending SARC's first in-person meeting of 2026 was meeting John Schouten VE7TI, Editor of The Communicator:



John Schouten VE7TI and Steve Stroh N8GNJ 2026-04-08; photo by Steve Stroh N8GNJ

I'm in awe of the stellar job VE7TI does in producing The Communicator and I gave him a number of appropriate kudos during my presentation. Appropriate because in being *free for anyone to access, with great content that represents Amateur Radio very well*, The Communicator is a significant resource in attracting and educating NewTechHams and potential NewTechHams.

And yes, boss 😊, I'm mindful that "deadline approacheth" for the next issue of The Communicator, and I'll get my column in on time.

GMRS in Canada Doesn't Require a License

I learned something New from Claude AI. I was fact checking what I thought I knew about various unlicensed radio services in the US and Europe (FRS versus DPMR, if memory serves), and I had the random thought to ask if GMRS was the same in Canada as it is in the US? ClaudeAI's response:

Yes, but with differences from the US:

GMRS is legal in Canada and uses the same frequencies as the US

No license required in Canada — this is the key difference from the US, where a \$35 FCC license is required

US GMRS radios work in Canada without modification

So ironically it's simpler to operate GMRS in Canada than in the US. Cross-border interoperability works fine since the frequencies are the same.

That mention of “cross border interoperability” probably needs a further fact check as us uptight Americans might be kerfluffled at a Canadian, with no license, communicating with a US GMRS user, or using a GMRS repeater.

Or, maybe not. *I have no idea* - I'll have to ask around as I'm sure that has come up here in the US / Canada Northwestern borderlands.

Hamvention 2026 Ho!

**5 weeks until [Hamvention 2026](#)
in Xenia, Ohio, USA...
Zero Retries / DLARC booth 1506
in Building 1 / Maxim**

The Technological Innovation In Amateur Radio Firehose Continues

This is yet another issue of Zero Retries that offers a smorgasbord of developments that are occurring, *now*, in Amateur Radio that you're probably not hearing about from other Amateur Radio media. I'm not afraid to candidly admit that *I can't keep up with how much is going on*, and, again, I drop stuff constantly that I'd love to mention.

In my wilder fantasies (*yeah, I lead a pretty tame life*), Zero Retries would be a *magazine*, perhaps monthly. I assign a promising subject for a story to one of a number of capable staff writers. When it comes back. I lightly proofread and edit it, and assemble it into a “73 Magazine” length magazine (online, of course, and free like The Communicator).

And maybe (*again, fantasizing here*) I can get organized enough, and the AI helpers get good enough, that I can actually accomplish at least something like Zero Retries Magazine. NotebookLM is a stellar research assistant. For general answers, I'm getting increasingly respectful of ClaudeAI.

We need a Packet Radio Appliance

That idea was going to be an article in this issue as a spinout of a email conversation I had this week, but once again, there were too many interesting things to bring to you in this issue. I really want to publish *on Friday*, and that article would take another few hours, so it's deferred for now.

Very generally... Amateur Radio needs a packaged solution for using more advanced capabilities that have emerged in Amateur Radio Packet Radio in the last couple of decades. All of this is available, it's just not integrated / packaged. One example is KM6LYW's mention of the integrated TNCs in some new portable radios... but those implementations are old, tired, and slow (but works fine for the use case - APRS). We need a “black box” that does:

- 3600 / 4800 / 9600 bps
- Both (simultaneous) FX.25 and IL2P Forward Error Correction
- Net/ROM automatic / auto discovery mesh networking
- Easy to create routers / gateways that would allow more than one radio / band to be used.
- Integrated BBS so that you can read BBS messages, bulletins, see files that were transferred to your BBS in the background
- Good chat system, at least equivalent to Raven in AREDN and Meshtastic / MeshCore.
- Interface is a web browser, similar to the way DigiPi works.
- Designed for a (reasonably priced) Raspberry Pi 3B+ - it's an appliance that connects to the radio.
- Integration of 44Net Connect for easy access to your station.

“Packaged” similar to [TARPN](#), but more generic than TARPN’s perspective of how to build a Packet Radio network. [DigiPi](#) is another great example of packaging, but DigiPi has many more modes than Amateur Radio Packet Radio, and is tightly optimized for use with the Raspberry Pi Zero 2W. I think the greater capabilities of the Raspberry Pi 3B+ is a better platform for what I’m imagining.

My correspondent said that my idea as I pitched it was a bit scattershot, and they were right, so this deserves not just an article but a full treatment as a specification.

Upcoming Events

It’s getting to be the busy season. I created the [Zero Retries Guide to Zero Retries Interesting Events page](#) as much for myself and my reference as for public usage.

Comcast - Grrr...

The house I’m staying at this weekend has Comcast Internet. Which mostly works fine (reasonably fast)... but of as I’ve described previously, Comcast customers, including me this weekend, cannot access www.zeroretries.radio.

I can just barely respect the “choice” of Comcast to consider www.zeroretries.radio as a potential phishing site. But, the way that they implement that decision is to simply break the connectivity and leave it for the customer to figure it out. Comcast *could* put up a redirect page with an explanation like “We consider this page to be potentially harmful so we’re not going to let you see it”. But no, they just break the connectivity with *no hint of an explanation*.

Thus I hope there’s a special circle in [Heck](#) reserved for the network engineers at Comcast who decided to implement that particular method of “protecting” Comcast customers.

As always, I am unreasonably happy to no longer be a paying hostage “customer” of Comcast.

Weekends Are For Amateur Radio!

I’m traveling this weekend, and I’m still not caught up on the conversion of pages and previous issues of ZR from www.zeroretries.radio to www.zeroretries.org. But I did bring my loaned MeshCore node, and with the article about CascadiaMesh, my interest is piqued.

Have a great weekend, all of you co-conspirators in Zero Retries Interesting Amateur Radio activities!

*Please offer comments / feedback about **Request To Send** on the [Zero Retries email list with the #ZR0246 hashtag](#).*

73,

Steve N8GNJ

Closing Thanks

My ongoing **Thanks** to:

Tina Stroh KD7WSF for, well, *everything!*

Jack Stroh, Late Night Assistant Editor Emeritus

Fiona and Shrekky Stroh, Late Night Assistant Editors In Training

Founding Members who generously support Zero Retries financially:

Founding Member 0000 - Steven Davidson K3FZT (Renewed 2025, *3rd year!*)

Founding Member 0001 - Randy Smith WU2S (Renewed 2025, *3rd year!*)

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Zero Retries 0246 was published on 2026-04-10. This issue was 7994 words.

Footnotes For This Issue

To see the relevant sentence for the footnote, just click the footnote number.

[1](#)

Two other implementations of “audio” OFDM for VHF / UHF that come readily to mind is VARA FM and more recently, the IP400 Project.

[2](#)

In Western Washington, WWARA is the entity that coordinates the use of “repeater pairs” on the VHF / UHF bands and “prioritizes” the usage of particular repeater pairs by particular repeaters.

[3](#)

The LinHT will make the multiple digital voice standards a non-issue from the perspective that being a fully Software Defined Radio, you won’t need a separate “DMR radio” to access a DMR repeater, and a separate “D-Star radio” to access a D-Star repeater”. You’ll just use the “DMR” module or the “D-Star” module on the LinHT to access a DMR repeater or a D-Star repeater.

[4](#)

This took some time and work to include. The Apple App Store “discourages” copying of text, but a consultation with ClaudeAI resulted in two effective workarounds.